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METHODOLOGY OF STUDENT ACTIVATION ON THE SUBJECT OF DETERMINING THE ROOTS OF A NONLINEAR EQUATION BASED ON A DECOMPOSITED GRAPH SCHEME

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Abstract

The main feature of the pedagogical technologies used in the educational process is to ensure the guaranteed achievement of the planned educational results. The method of decomposing the content of subjects is a necessary condition for the technologization of the educational process, but it is not sufficient to achieve guaranteed effective knowledge. All students strive to successfully complete one or another subject, but not all achieve the same high results. In our opinion, in order to further improve and increase the quality of the educational process, a graph scheme is proposed that represents the sequence of effectively describing the content of logically structured topics according to the student's levels of knowledge acquisition.

Keywords: *educational science, analysis, decomposition, logical structure, graph scheme, module, educational process, efficiency*

Introduction

The process of decomposition of the system is multi-step, leading to a tree-like structure. The qualitative side of the demand for this structure causes two conflicting principles (Pervozvansky A.A., Gaitsgori V.G., 1979; Gushchina, O.M., 2013; Narman H.S., 2020): completeness, integrity (the problem should be considered as comprehensively and in detail as possible) and simplicity (the tree should be highly coherent both "widthwise" and "longitudinally" should). The balance between the stated quantitative requirements arises from the qualitative requirements: to reduce the analyzed complex object to a set of simple objects, if this is not possible, then it is necessary to determine the exact causes of the intractable complexity.

Literature analysis

The topic decomposition process is multi-step, which, as mentioned above, leads to a

tree-like structure. In this structure, the quality side of the requirement is divided into two opposite principles (Pervozvansky A.A., Gaitsgori V.G., 1979; Gushchina, O.M., 2013; Narman H.S., 2020; Burakov N.B. 2020): completeness (the problem should be considered as comprehensively and in detail as possible) and simplicity (the tree should be highly consistent both "widthwise" and "longitudinally"). The balance between the stated quantitative requirements is derived from the qualitative requirements. It is necessary to determine the exact causes of the intractable complexity, if it is not possible to bring the complex subject under study and analysis to a set of simple logical complete semantic objects.

The principle of simplicity in terms of the "width" of the tree! it is necessary to reduce its size (determined according to the number of meaningful model elements, logical concepts), therefore, it requires a more coherent model as a basis, on the other hand, the principle of completeness It requires to make the most developed and perfected content model as possible. In this case, a compromise is achieved using the concept of purpose-essence, that is, components, logical elements, which are essential to the purpose of the analysis, are added to the model. This issue will be resolved by experts.

The principle of simplicity from the point of view, it is desirable to reduce the size of the semantic tree of the topic "longitudinally", that is, it is necessary to reduce the number of decomposed hierarchical steps, it is better to bring it to 2–3 steps. However, from the point of view of the principle of completeness of the topic, the decomposition can be continued as desired, until a specific decision is made (objects, issues, topics, etc. of different complexity can have different "depth" levels of decomposition). Such a decision can be made according to the following considerations:

– first of all "Longitudinal" decomposition is stopped after obtaining a result that does not require further division into parts (small system, small goal, small task, small object, etc.), that is, after it leads to a simple, understandable, secure, solution-obvious result. This result is called simple (the concept of simplicity). For some issues (for example, mathematical, technical, economic, etc.), the concept of simplicity is clarified to a simple, clear formalized form, to a logical concept, while for other issues, it remains vague and is defined by experts.

Secondly, in non-simple fuzzy fragments, its decomposition is different, previously unused, the model obtained by gradually hierarchically dividing the previous model into parts is obtained as acoc. Because new essential elements and concepts can be obtained by decomposing existing components, the decomposition algorithm must include the possibility of returning to the model that was previously used. There is no need to revise all the elements and logical concepts of the model, it is enough to consider only the newly introduced ones.

In the shown algorithm (Fig. 1) allows the use of models in different parts in different areas, where the more parts are divided, the more useful it is.

For pedagogy, the issue of decomposing the content of educational programs is the main one. Decomposition of the content of educational programs is carried out by developers of educational documents (Narman H.S., 2020; Burakov N.B., 2016; Shatalov M.A., Yusupov F., Shamuratova I., Yusupov D. and Khudayberganov T., 2012; Yusupov, D.F., 2016).

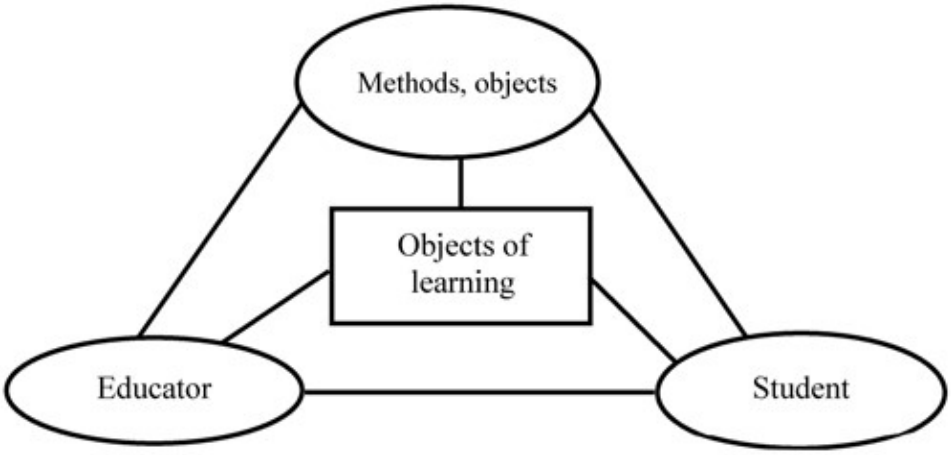
- by subjects (study courses), which in turn are divided into sections, sections by subjects, subjects by separate classes, etc. (a structuring option of dividing the educational content into subjects);
- by modules (another option is modular study of the curriculum in object decomposition). In turn, the module is divided into separate blocks (credit units) and so on. In general, the division ends with the minimal indivisible "unit" of the educational process – the issue of education.

Methodology

Based on the above considerations, we will develop a method of teaching the studied topic by decomposing it based on the principles of logic, that is, in the form of a systematic structure, into simple, comprehensible logical parts without breaking the integrity of the content.

The problem of selecting and structuring the components of the educational material has been widely discussed among pedagogues, experts and scientists for a long time. Currently, there are many models that represent the meaningful logical structure of educational material. Although the nature of these models is different, the used methods and approaches have been successfully tested in real pedagogical processes and have given their positive results. As a result of the analysis of the nature of the educational process, most authors emphasize that it is twofold. The essence of teaching P.I. Pidkasisty: "... teaching can be characterized as a goal-oriented process of mutual active actions between the teacher and the learner, as a result of which the learner acquires a certain level of knowledge, skills, experience of activity and behavior, as well as personal qualities, that is, it is a new quality rises to the level of interpreted. In the current modern interpretation of education, it is usually added its third element – learning content". The educational process does not have a two-way character at all. It is implemented with the help of a large number of connections between the teacher, the student and the object of learning (Fig. 1).

Figure 1. *The numerous relationships that exist between the teacher, the student and the object of learning*



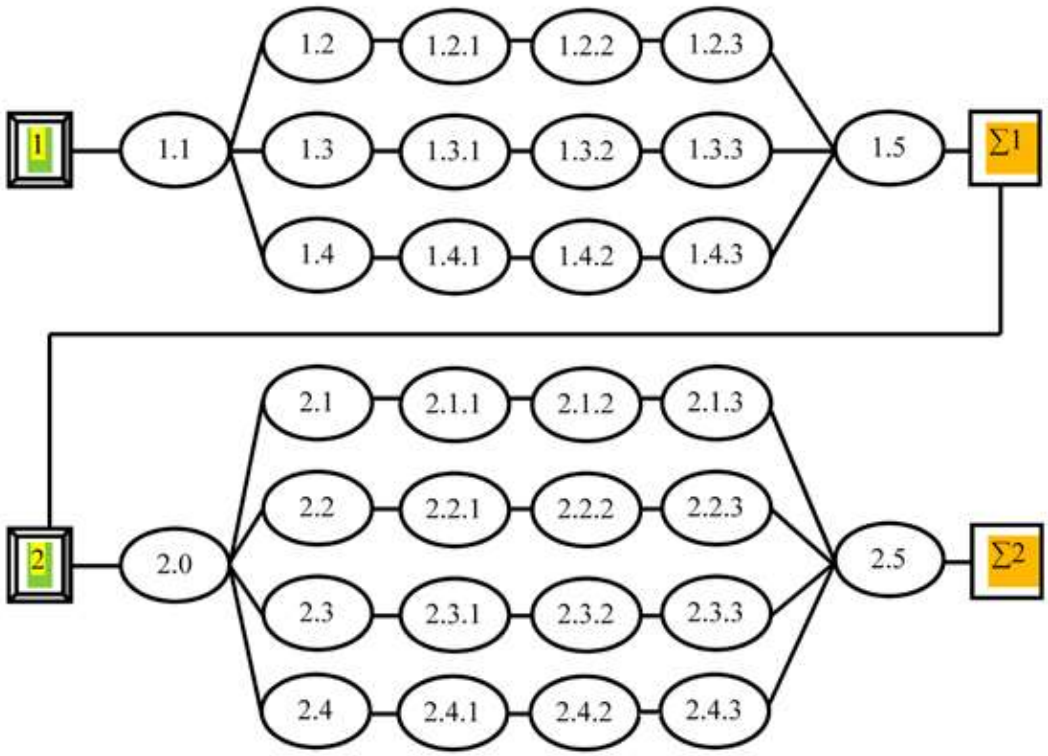
The topic of approximate determination of the roots of a nonlinear equation (Yusupov, D. F. 2016; Zenkov A.V., 2016) can be visualized as a structured graph scheme in the form of elements divided into logical sections (concepts) (Table 1).

Table 1. – *Concepts of logical completion of the subject*

No.	Educational elements, basic concepts
1	Determination of the section-interval where the roots of the nonlinear equation lie, general considerations
1.1	Methods of determining the interval in which the roots of a nonlinear equation lie
1.2	Analytical determination of the interval in which the roots of a nonlinear equation lie
1.2.1	Mathematical description
1.2.2	Build an algorithm
1.2.3	Compilation of the program, implementation, testing and obtaining the result
1.3	the interval in which the roots of a nonlinear equation lie graphically
1.3.1	Mathematical description
1.3.2	Build an algorithm
1.3.3	Compiling, debugging, testing and getting results
1.4	Algorithmic determination of the interval in which the roots of a nonlinear equation lie
1.4.1	Mathematical description

No.	Educational elements, basic concepts
1.4.2	Build an algorithm
1.4.3	Compiling, debugging, testing and getting results
1.5	Giving individual assignments to students
∑1	Assessment of student knowledge
2	Methods of approximate determination of the root of a nonlinear equation in the interval in which it is found
2.0	Methods of approximate determination of the root of a nonlinear equation in the interval found, general considerations
2.1	A method of bisecting an interval
2.1.1	Mathematical description
2.1.2	Build an algorithm
2.1.3	Compiling, debugging, testing and getting results
2.2	Simple iteration method
2.2.1	Mathematical description
2.2.2	Build an algorithm
2.2.3	Compiling, debugging, testing and getting results
2.3	Newton's method
2.3.1	Mathematical description
2.3.2	Build an algorithm
2.3.3	Compiling, debugging, testing and getting results
2.4	Combined method of Vatar and Urunma
2.4.1	Mathematical description
2.4.2	Build an algorithm
2.4.3	Compiling, debugging, testing and getting results
2.5	Giving individual assignments to students
∑2	Assessment of student knowledge

Figure 2. *Structured logic graph scheme of the topic*



The scheme of the logical graph structured in the decomposition method of the subject can be imagined as follows (Fig. 2).

Now, based on the logical graph scheme of the topic, in the process of describing and explaining each educational element (lecture, practice, experiment-test, seminar), the methodology and set of software agents (tools) will be developed, respectively, for the effective use of modern information communication and pedagogical technologies.

Summary

By dividing the content of the educational material into structures based on some criteria, systematizing the content and explaining the science based on modern technologies (lecture, practical, experience), organizing the process of mastering the content and essence of the subject in a communicative (online, offline) individual way, in the form of a teacher-student, saves time. It is possible to increase the efficiency of the educational process, to develop effective methods and methods of teaching material.

References:

Pervozvansky, A.A., Gaitsgori, V.G. Decomposition, aggregation and approximate optimization.– M.: Nauka, 1979.– 344 p.

Gushchina, O.M. Structural analysis and design of educational process management systems: textbook. the manual //O.M. Gushchina, S.V. Lapteva.– Togliatti: TSU Publishing House, 2013.– 188 p.

Narman, H.S. *et al.* "Augmented Reality for Teaching Data Structures in Computer Science", *2020 IEEE Global Humanitarian Technology Conference (GHTC)*, Seattle, WA, USA, 2020.– P. 1–7. Doi: 10.1109/GHTC46280.2020.9342932

Burakov, N.B. Decomposition of educational action as a way to improve the quality of technologization of the process of teaching young children // "Collection of materials of the Annual international scientific and practical conference "Education and training of young children". 2016.– P. 455–457.

Shatalov, M.A. Methodology of selection and structuring of the content of training courses // International Journal of Experimental Education. 2012.– No. 4–2.– P. 274–278.

URL: https://expeducation.ru/ru/article/view?id=4062/ (accessed: 08/26/2023).

Yusupov, F., Shamuratova, I., Yusupov, D. and Khudayberganov, T. "Improving the effectiveness of teaching the course "Data structure and algorithms" based on structuration and integration of the discipline", 2019. International Conference on Information Science and Communications Technologies (ICISCT),– Tashkent, Uzbekistan, 2019.– P. 1–4. Doi: 10.1109/ICISCT47635.2019.9011846

Yusupov, D.F. Logico-structured presentation of educational material on the topic organization of cyclic computing processes in C++ / D.F. Yusupov, Uktamboy Sapaev.– Text: direct // Young scientist. 2016.– № 9.5 (113.5).– P. 77–83. URL: https://moluch.ru/archive/113/29721/ (date of reference: 08/26/2023).

Zenkov A.V. Numerical methods: textbook. manual / A.V. Zenkov.– Yekaterinburg: Izdvo Ural. un-ta, 2016.– 124 p.

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